

Current Status and Direction: ATP

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Presentation to:

Visiting Committee on Advanced Technology

National Institute of Standards and Technology

December 9, 2003

Outline

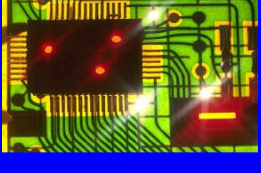
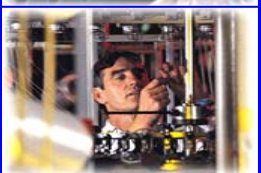
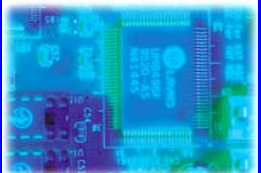
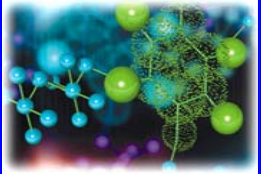
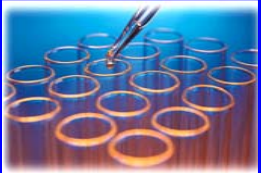
- Overview
- Current Status
- Future Direction

Overview

A decorative graphic consisting of a large, light blue arc that starts from the top left and curves towards the bottom right. A smaller, darker blue wedge shape is positioned at the end of this arc, pointing towards the bottom right corner of the slide.

ATP's Mission

To accelerate the development of
innovative technologies for
broad national benefit through
partnerships with the private sector.



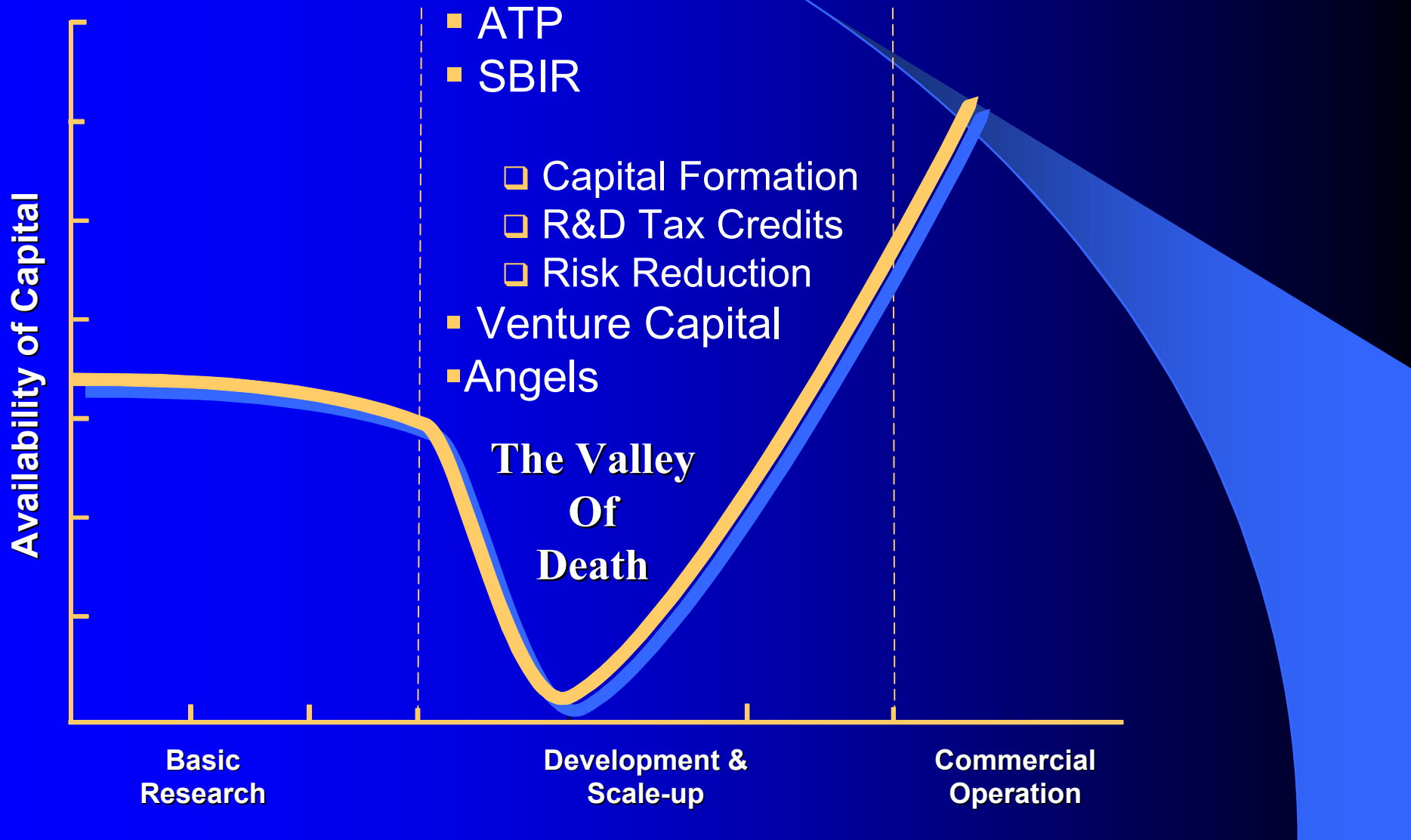
ATP's Legislative Goals

“...assisting United States businesses in creating and applying the generic technology and research results to —

- (1) commercialize significant new scientific discoveries and technologies rapidly; and
- (2) refine manufacturing technologies”

- *Omnibus Trade and Competitiveness Act of 1988, Public Law 100-418*

Technology Policy Framework

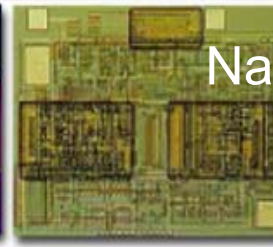
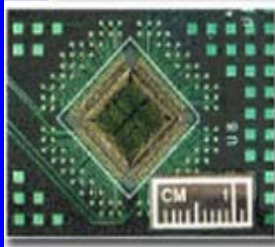
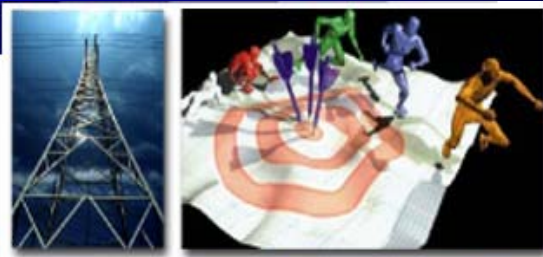
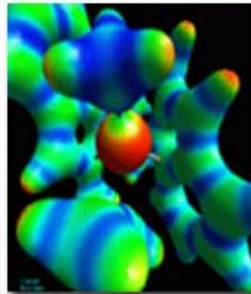


Fourteen Years of Innovation

- Since 1990, **6,054 proposals** submitted to **43 competitions**, requesting **\$12,969 million** from ATP
- **709 projects awarded** with **1,433 participants** and an equal number of subcontractors
- **207 joint ventures** and **502 single companies**
- **\$4,101 million** of high-risk research funded
 - *ATP share = \$2,114 million*
 - *Industry share = \$1,987 million*
- Over **165 universities** participate
- Over **30 national laboratories** participate
- **SMALL BUSINESSES ARE THRIVING**
 - *65% of projects led by small businesses*

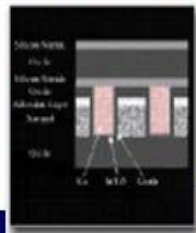
Drug Discovery Technologies

DNA Diagnostics



Nanomaterials

Fuel Cells



Biomanufacturing

Aquaculture

Homeland Security

Regenerative Medicine

Discrete Manufacturing

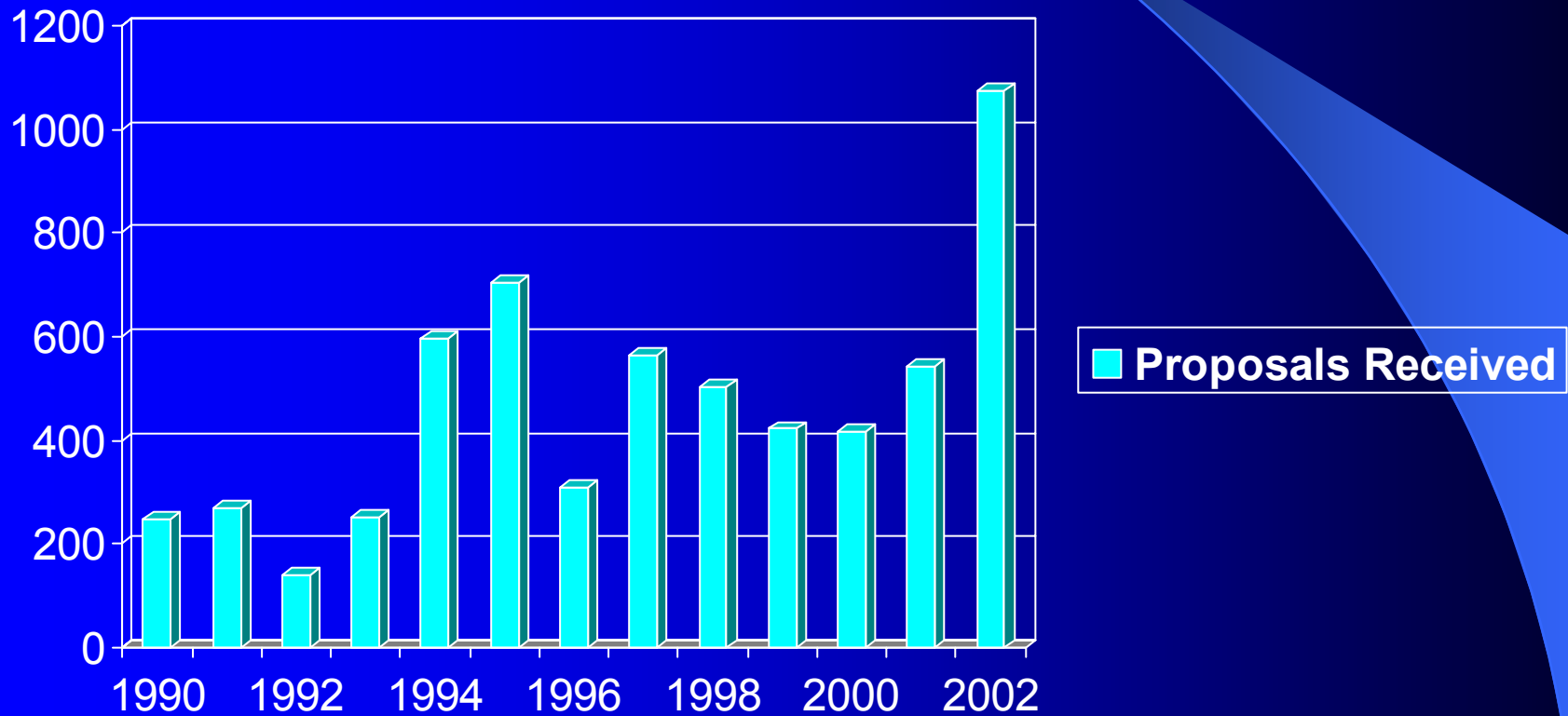
Current Status

- Competition
- Interaction with NIST
- Assessments
- Budget

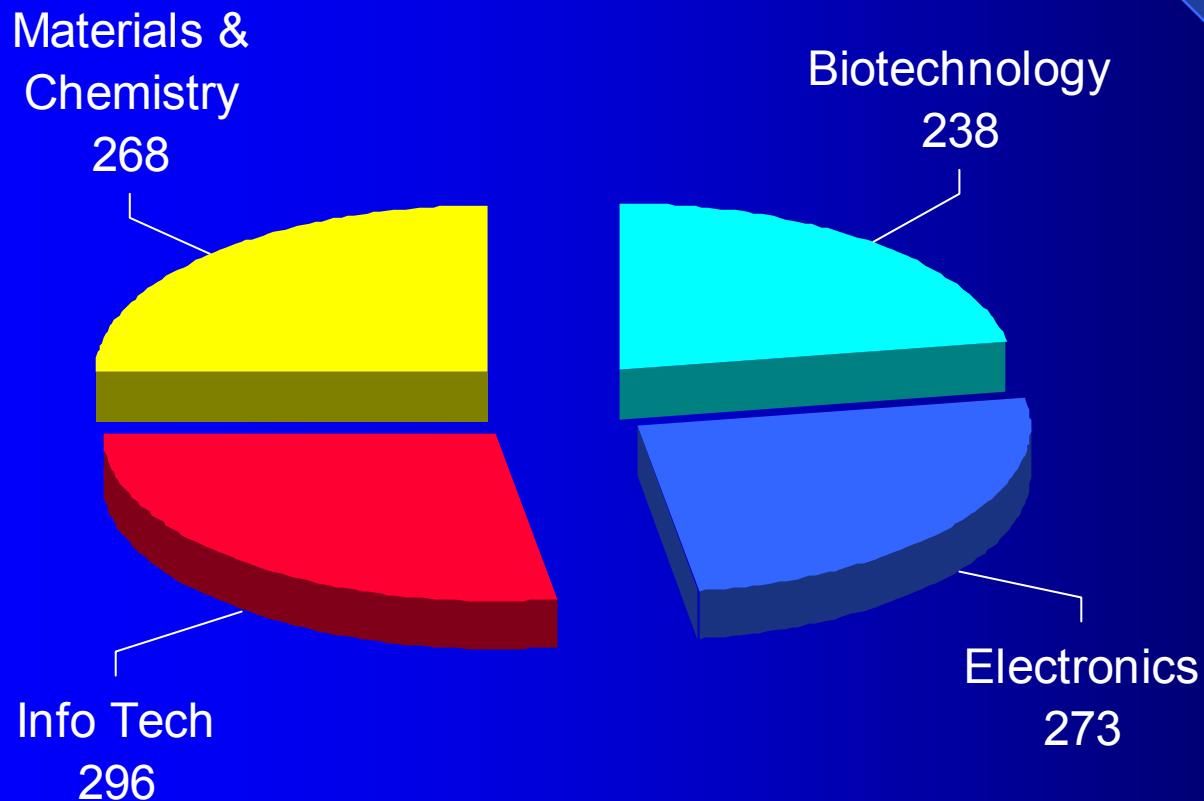
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More Proposals Than Ever



Proposals Covered All Technology Areas

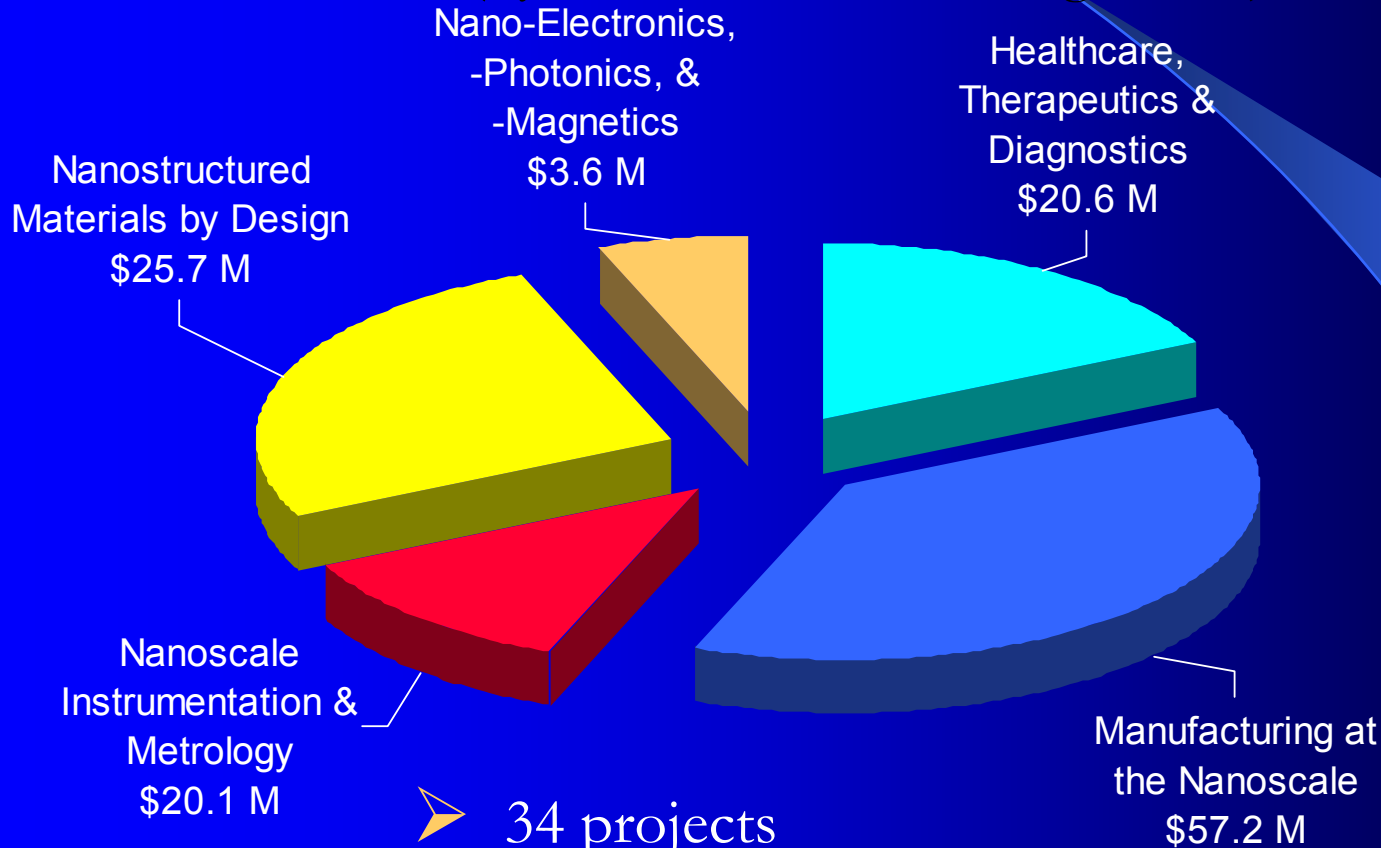


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ATP Investments in Nanoscale Technologies

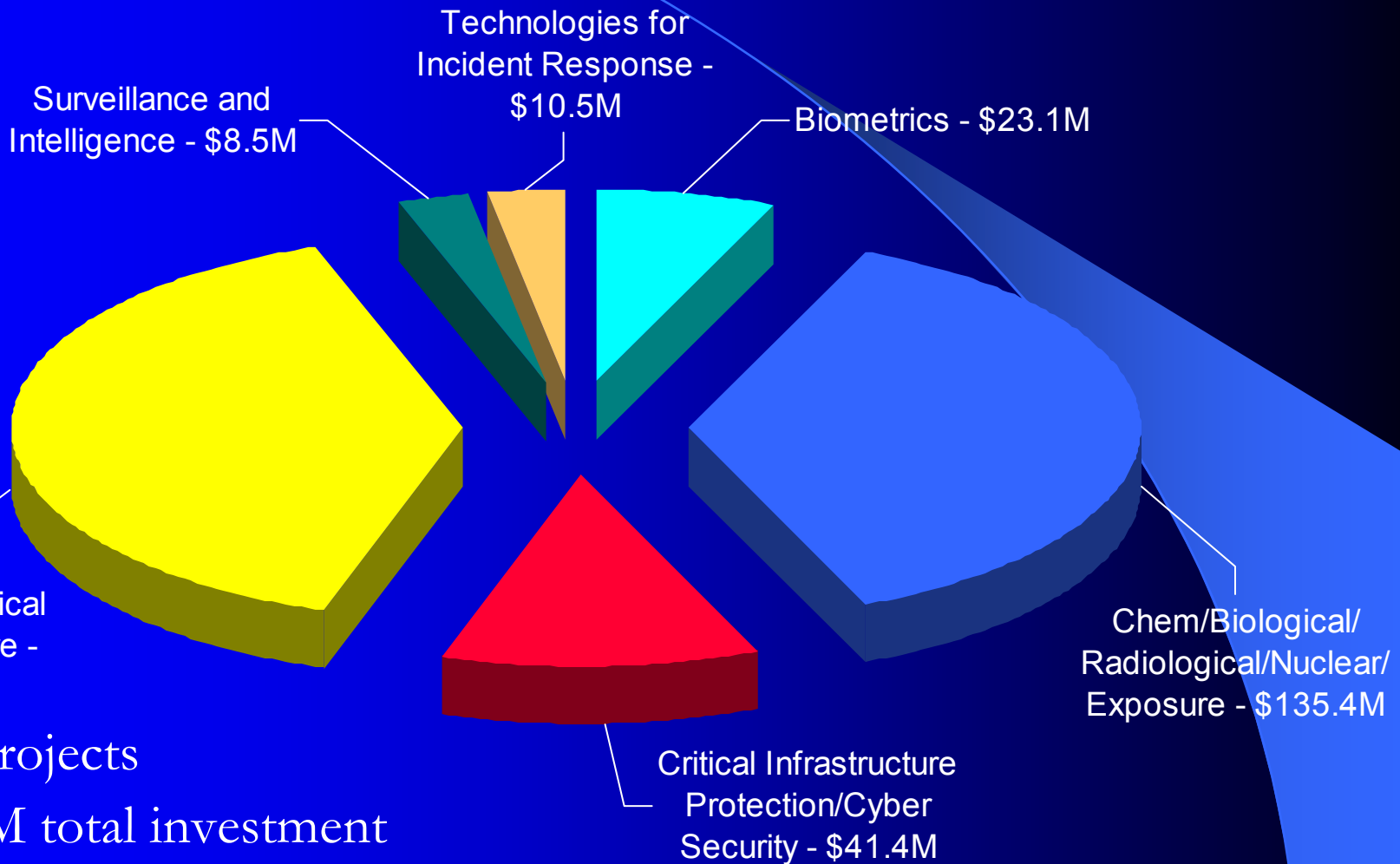
(by NNI Grand Challenge Area)



- 34 projects
- \$246.7 M total investment
- ✓ **\$127.1 M ATP share**
- ✓ **\$119.6 M Industry share**

ATP Investments in Technologies Related to Homeland Security

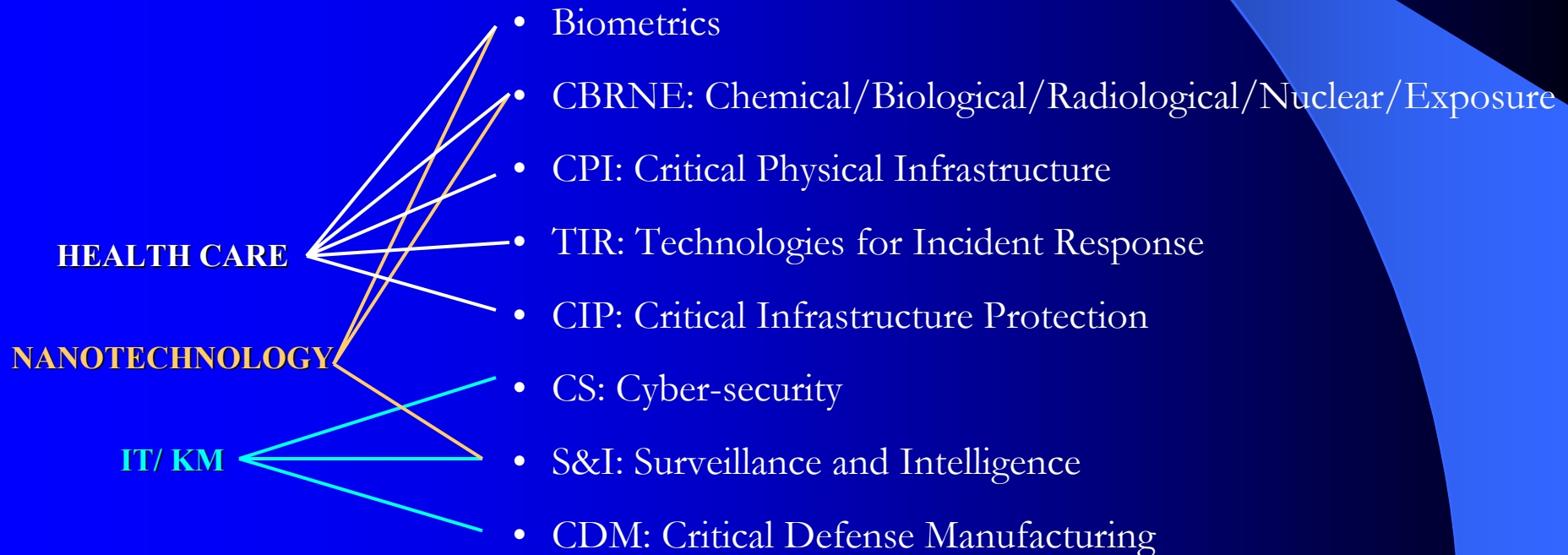
(through September 30, 2003)



- 141 projects
- \$669M total investment
- ✓ **\$364M ATP share**
- ✓ **\$305M industry share**

Enabling Technologies Align with NIST Strategic Working Groups: Homeland Security

HOMELAND SECURITY





**SEMICONDUCTOR/
ELECTRONICS/
PHOTONICS**



**DISCRETE
MANUFACTURING**



**ENERGY
PRODUCTION/
STORAGE/
TRANSMISSION**



MANUFACTURING



**BIO-
MANUFACTURING**



**AUTOMOTIVE
MANUFACTURING**

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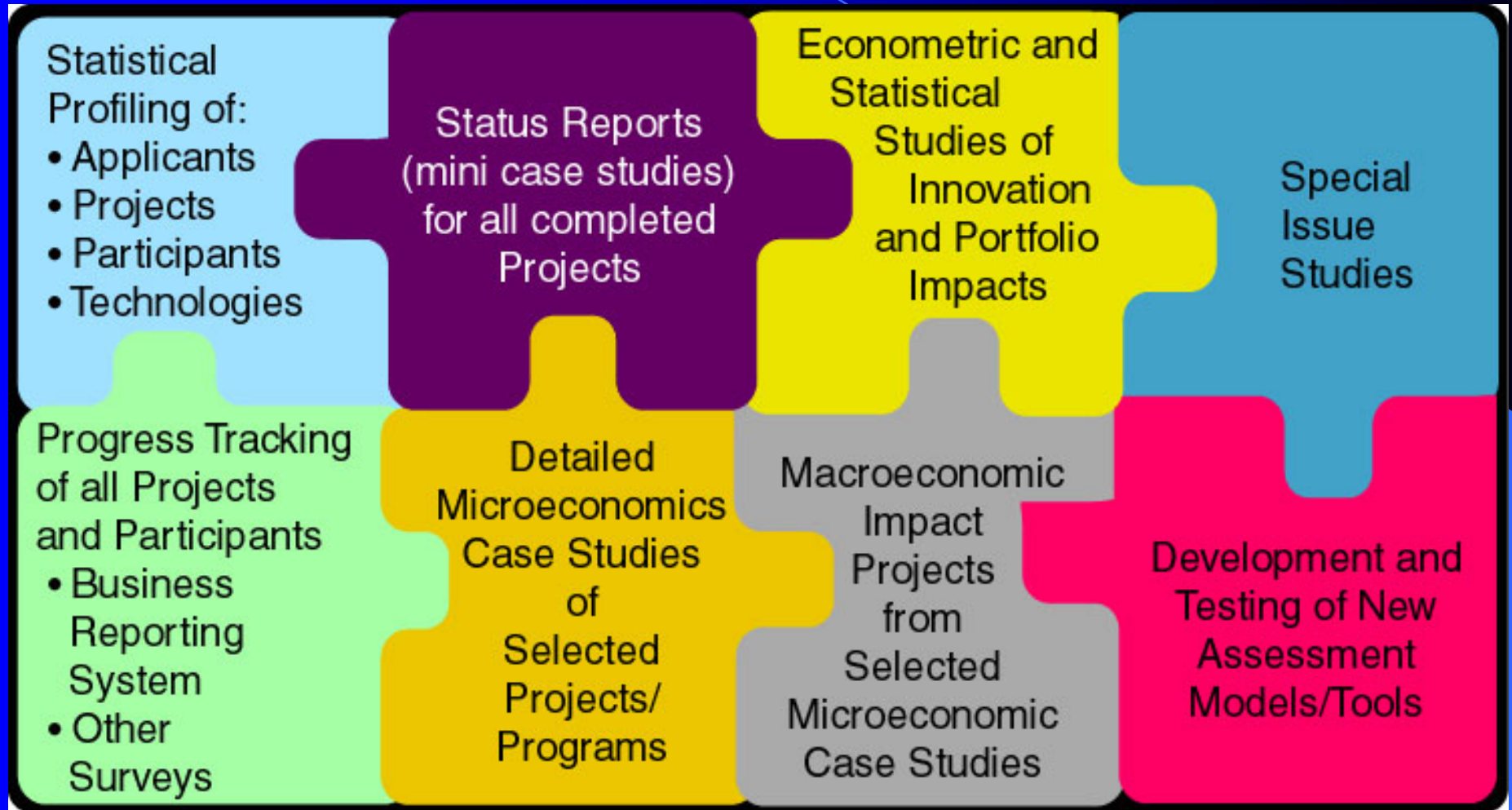
“An Exceptional Assessment Effort:

The ATP assessment program has produced one of the most rigorous and intensive efforts of any U.S. technology program.”

-National Research Council

The Advanced Technology Program: Assessing Outcomes

Components of ATP's Assessment Program



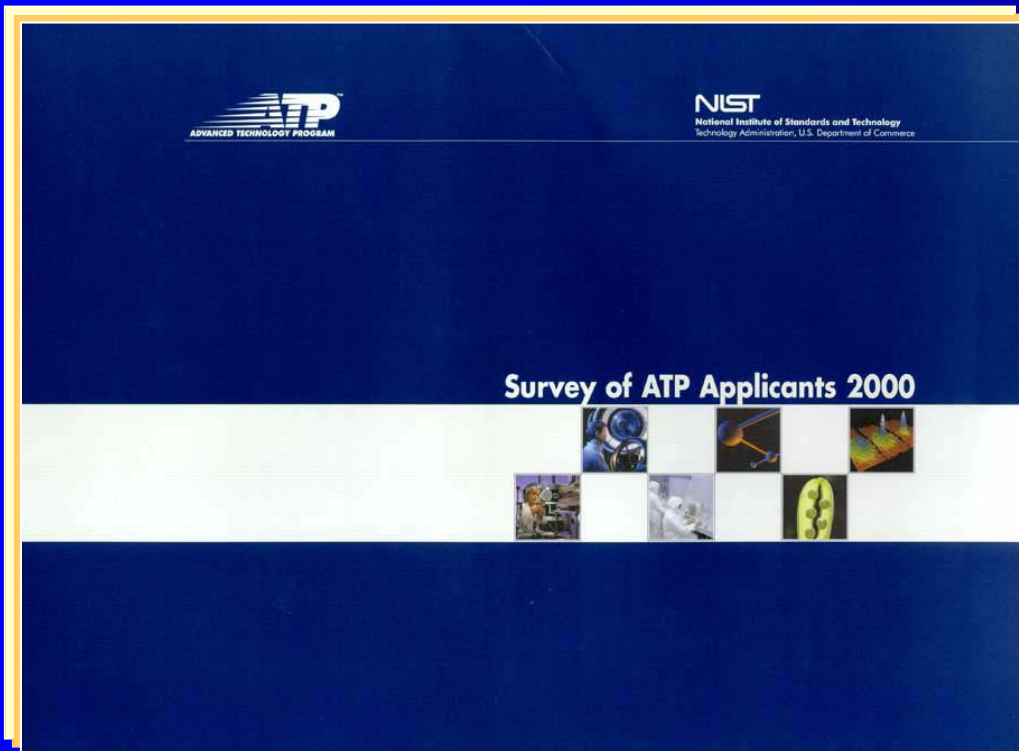
Recent Assessments Demonstrate

- ATP substantially expanded and enhanced R&D activities
- Limited private funding available for early-stage technology development activities.
- ATP targets technology development that VCs do not address
- Participation in research consortia associated with increased research productivity.
- Estimated benefit-cost ratio of at least 125:1 in digital mammography applications
- More than \$15B in expected present value of social benefits from just a few projects!

Survey of ATP Applicants 2000

Key Findings:

- ATP awards attract additional funding (“**Halo Effect**”)
- ATP fosters new R&D directions and partnerships
- ATP fosters collaboration between companies and universities



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Budget

- Conference Agreement:
 - \$179.175M
 - \$60.7M for New Awards
 - Focused Competition on Homeland Security

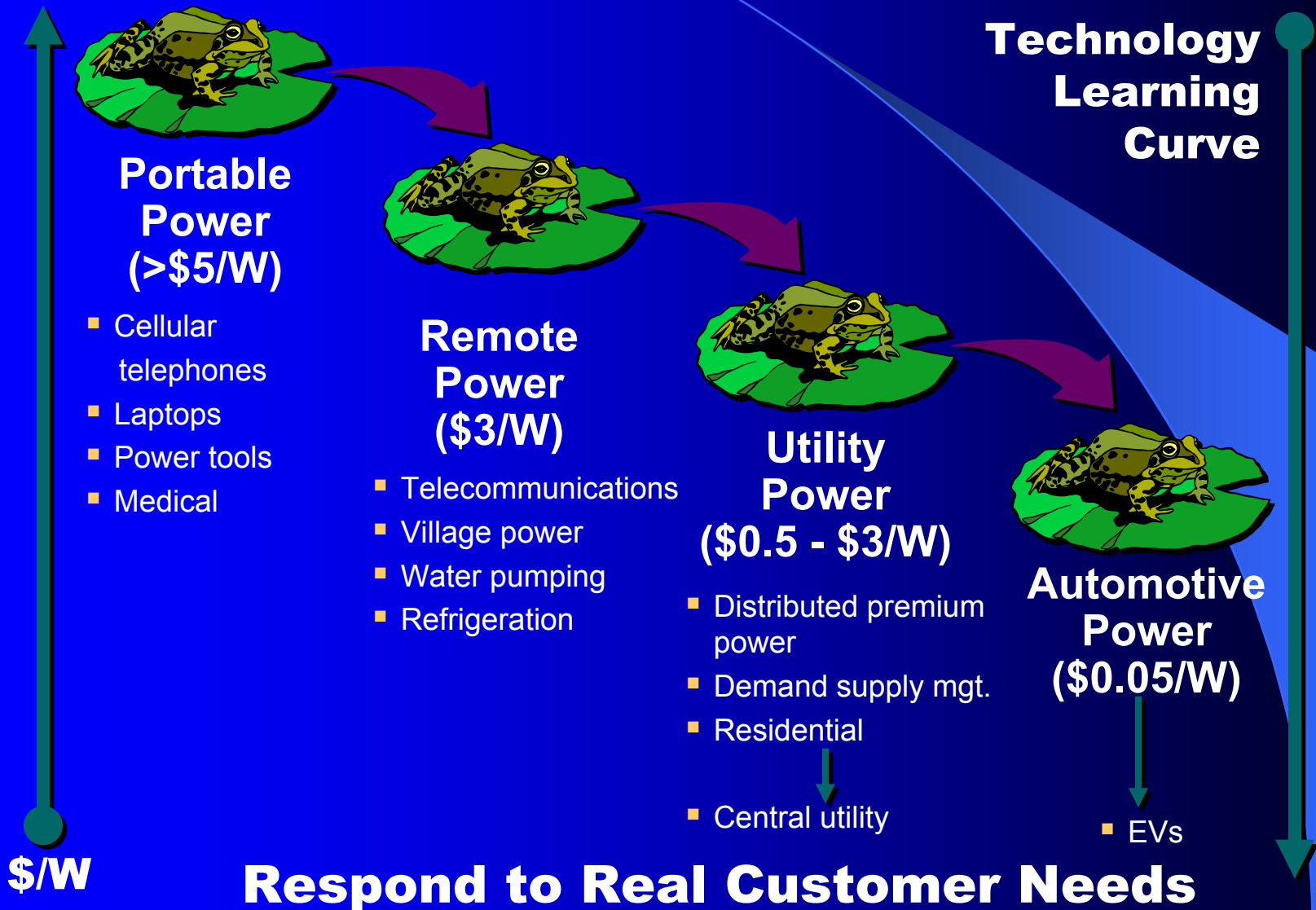
Future Direction

- Promising Areas
- Challenges
- New Partnerships

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Leap Frogging to Tomorrow's Power Technologies



Energy / Photovoltaics

Advancing the Solar Century – Ubiquitous Solar Cell Manufacturing Evergreen Solar Inc., Marlborough, MA



October 2000 – October 2003

Total project budget: \$3,760,714

ATP Cost Share: \$2,000,000

Project

- ✓ Develop the Quad ribbon growth process: an ultra-compact crucible that grows four ribbons at once with very low energy and materials input.
- ✓ Utilizes completely new principles in meniscus and crucible temperature control.
- ✓ Very low capital, consumable, and labor costs.

Project Impacts

- ✓ Much reduced manufacturing cost of PV cells approaching \$1 per Watt.
- ✓ Allows wider spread use of solar cells for grid-connected and in developing country applications.

Energy / Fuel Cells

Distributed Premium Power Fuel Cell Systems Incorporating Novel Materials and Assembly Techniques

Plug Power, Inc., Latham, N.Y.

Other Participants: SRI International, Menlo Park, Calif.; Polyfuel, Inc., Menlo Park, Calif.



May 1999 to May 2002

Total project budget: \$9,738K

ATP Cost Share: \$4,738K

Project

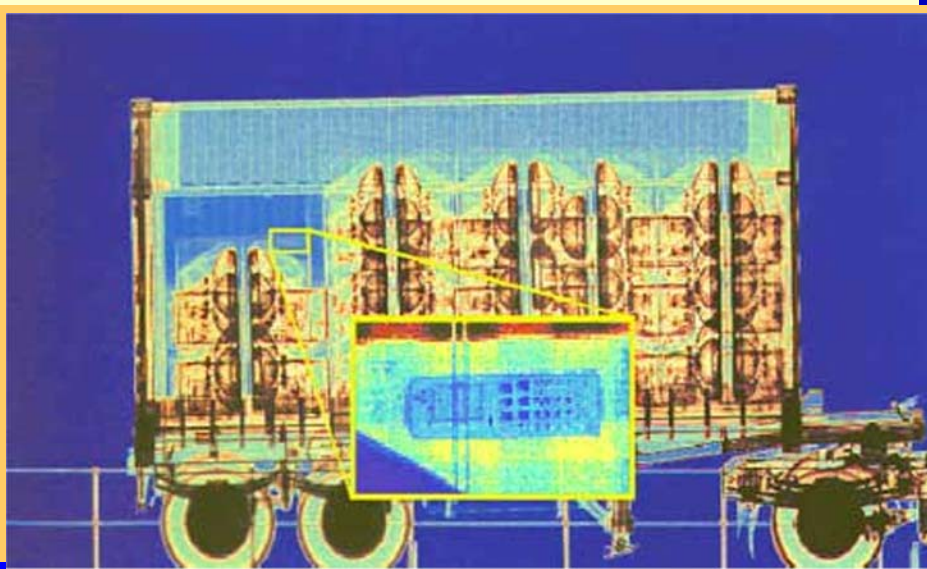
- ✓ Create fuel cell systems based on high-temperature membrane technology that can tolerate high levels of carbon monoxide beyond 50ppm today.

Impacts

- ✓ Succeeded in producing PEM fuel cells with high-temperature membrane operating at $>150^{\circ}\text{C}$ (with Celanese Ventures)
- ✓ Demonstrated 20,000 ppm CO tolerance with more than 5000 hours stable endurance
- ✓ Significantly simplified PEM fuel-cell system
- ✓ ATP has pioneered funding PEM fuel cells for distributed power generation.

Imaging/Homeland Security

Novel X-ray Security Systems: Fast, Accurate, and Affordable
Varian Medical Systems, Mountain View, CA
Palo Alto Research Center, Palo Alto, CA



October 2003 – October 2007

Total project budget: \$11,759,104.00

ATP Cost Share: \$5,873,013.00

Project

- ✓ Develop very large-area digital X-ray and chemical inspection systems of cargo containers at airports, seaports, and other points of entry with heretofore-unavailable accuracy for near error-free screening.

Project Impacts

- ✓ Faster, cheaper, and more accurate inspections of luggage, air and ship cargo containers, in real time.
- ✓ Increase the number standard cargo containers that could be inspected

Rapid Tooling Technologies

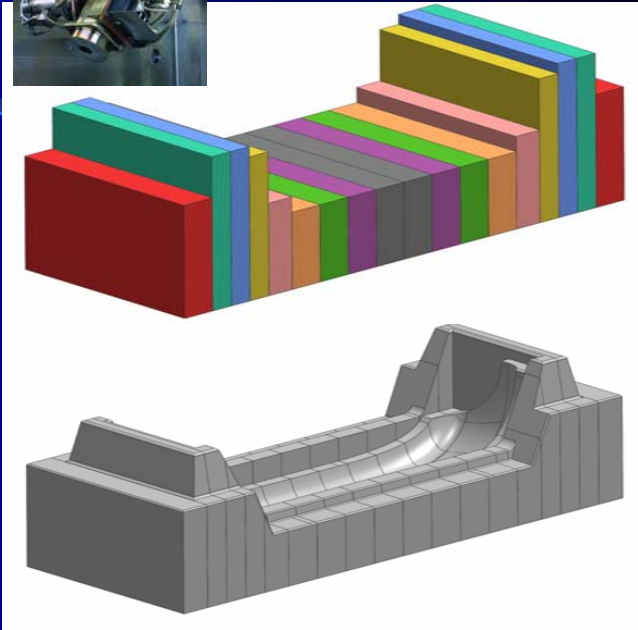
“Old School”

- Machine, cut, assemble pieces
- Trial and error method
- Limited range of materials
- Labor and skill intensive

Advanced technologies have reduced tooling time from months to weeks, providing a potential competitive advantage to domestic tool and die companies.



EB Welded Tool Blanks



New Approaches

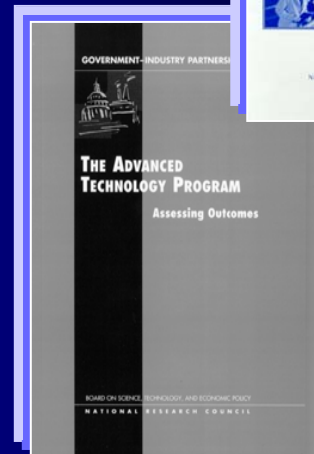
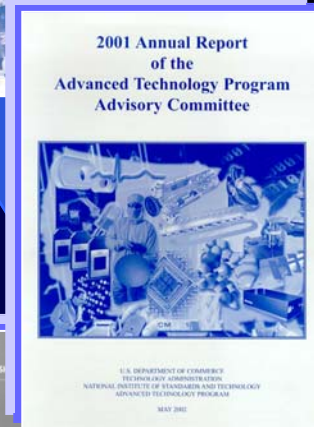
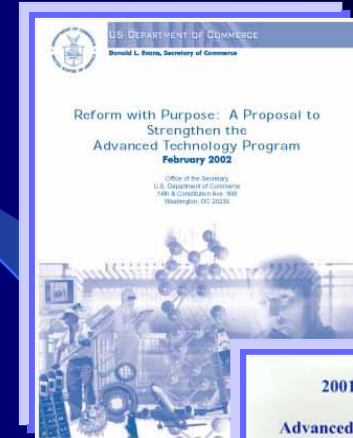
- Advanced process simulation techniques
- Built in heating and cooling channels
- Shorter tooling time
- Ease of reconfiguration

Future Direction

- Promising Areas
- Challenges
- New Partnerships

Major Challenge Ahead

- **Stability**
 - **Reform with a Purpose**
(Secretary Evans)
 - **The Advanced Technology Program: Assessing Outcomes**
(NRC)
 - **Annual Report of the ATP Advisory Committee**
(ATP Advisory Committee)



Future Direction

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Strategic Partnerships

- Development of New Partnerships
 - States
 - National Governors' Association (NGA)
 - Universities
 - Government Agencies
 - DHS
 - NIH
 - NIST Laboratories